ATV Transitional Television Station Requirement for Equipment and Descriptions		
Unit #	**Req.[1]**	**Description**
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[1] Requirement for each Unit indicated by: X = Required, O = Optional, N = Not Needed

IS/WP2-019
21 APR 92

TELESECTOR RESOURCES GROUP
TECHNOLOGY AND NETWORK PLANNING
MARKETING TECHNICAL SUPPORT

April 20, 1992

Subject: Advanced Television Services

MR. WEISS:

As requested, the following are some of the different transmission alternatives a common carrier may use in transporting the advanced television (ATV) signal across the public switched telephone network (PSTN):

1) 20 Mb/s ATV signal

A common carrier can presently use either DS-1 (1.544 Mb/s)[1] or DS-3 (44.376 Mb/s)[2] level digital transmission facilities to transport a single 20 Mb/s ATV signal across the PSTN. It can use a DS-3 level digital transmission facility to transport multiple 20 Mb/s ATV signals across the network.

2) 360 Mb/s ATV signal

Presently, a common carrier, using complex multiplexing/demultiplexing techniques, can transport a 360 Mb/s ATV signal across the PSTN using DS-3 level digital transmission facilities. Also, assuming SONET OC-1 (51.84 Mb/s) level fiber optic transmission facilities have been deployed in the PSTN, a common carrier, again using complex multiplexing/demultiplexing techniques, can transport the 360 Mb/s ATV signal across the PSTN via OC-1 level digital transmission facilities.

Furthermore, assuming SONET OC-12 (622.08 Mb/s) level fiber optic transmission facilities have been installed by the common carrier, OC-12 level facilities can be used to transport the 360 Mb/s ATV signal. Due to the lack of availability of an OC-12 level optical/electrical interface (STS-12), the 360 Mb/s ATV signal will need to be multiplexed and demultiplexed in order to be transported across the common carrier network. It is expected that, given appropriate manufacturer incentive, a STS-12 interface may be developed and made available for possible common carrier use in the network. This interface would eliminate the need to perform the

[1] A T1 transmission facility operates at the DS-1 line rate.

[2] A T3 transmission system operates at the DS-3 line rate.

expensive multiplexing/demultiplexing necessary to transport the ATV signal across the PSTN.

3) 1.2 Gb/s ATV signal

Similar to the alternatives associated with the 360 Mb/s ATV signal, a common carrier, using multiplexing/demultiplexing techniques, can transport the 1.2 Gb/s ATV signal using either DS-3 or OC-1 level digital transmission facilities.

A common carrier can also use, assuming deployment, SONET OC-24 (1244.16) level fiber optic transmission facilities to transport the 1.2 Gb/s ATV signal. As with the transportation of the 360 Mb/s ATV signal, to send the 1.2 Gb/s ATV signal across OC-24 level transmission facilities, the signal will need to be multiplexed and demultiplexed because of the unavailability of an OC-24 level optical/electrical interface (STS-24). It is expected that, given appropriate manufacturer incentive, a STS-24 interface may be developed and made available for possible common carrier use in the PSTN.

NOTE: The alternatives associated with each of the different possible ATV transmission rates might require some level of "bit stuffing" to take place.

The telecommunications industry is currently investigating the use of different broadband PSTN switching alternatives (e.g., "fast packet" switching), if you would like any information regarding these broadband switching alternatives, please give me a call and I will be happy to supply you with the information you request. My telephone number is (914) 644-6165.

Paul Donovan

Paul Donovan

Copy to:
Mr. Lawrence
Mr. Raymond

IS/WP2-0191
21 APR 92

FCC Advisory Committee on Advanced Television Service
Implementation Subcommittee Working Party 2 on Transition Scenarios

April 6, 1992

Dr. Jae S. Lim, Director
Advanced Television Research Program
Department of Electrical Engineering and Computer Science
Massachusetts Institute of Technology
36-653 MIT
Cambridge, MA 02139

By FAX and Priority Mail

Dear Dr. Lim:

Further to your response to the questions previously posed to proponents by IS/WP-2, the Working Party has reviewed the material you supplied. It has now developed a series of follow-up questions specific to your initial responses regarding Channel-Compatible DigiCipher. Those follow-up questions are attached.

The Working Party asks you to respond to these follow-up questions, in writing, in time for consideration at its next meeting, to be held on the afternoon of Tuesday, April 21. The Working Party will also be considering when it can meet with you or your representative in person for the same sort of system presentation and discussion recently held with the other proponents. Please provide information on when you will or will not be available for such a meeting over the next two months.

In addition to the follow-up questions attached, a simplified system block-diagram of a television station was sent to you by FAX on March 18. All of the proponents have been asked to comment upon it. In particular, you are asked to identify the type of signal form you expect to appear at each of the interconnections within that system and the contents of the various blocks. Based on discussions that took place during the joint meeting with proponents and SS/WP-3, a revised drawing and a spreadsheet for you to fill in will be forwarded shortly to elicit your comments.

The Working Party previously asked for your comments on its Lists of Assumptions, PERT charts, and Gantt charts. Copies of those documents were forwarded to you at the beginning of this process. You have made no comments on them so far. Your comments on those elements of our work are still invited.

Please note that the Working Party recognizes that release of your system description is imminent. You indicated to me in our telephone conversations that it should be available by now. The Working Party expects that your responses to its requests for information will be written independently of the system description document and will provide full disclosure at the level of detail that the system description should provide. Please contact me immediately if your system description document will be further delayed and the Working Party's expectation therefore causes some difficulty for you.

As always, if you have any questions about the material being sent to you by IS/WP-2 or should you need to discuss the plans for the meeting we would like to schedule with you, please do call me. You can reach me at: (908) 906-0907.

Very truly yours,

S. Merrill Weiss, Acting Chairman
Implementation Subcommittee Working Party 2 on Transition Scenarios

Attachment

IS/WP-2 Follow-up Questions Regarding Channel-Compatible DigiCipher

General

1. Please expand on your answer and explain the operation of the protocols and data structures in your system. Specifically: Are the header protocols and data structures proprietary or do they conform to some industry standard? If not a standard, what would it take to adapt such a standard for use within the Channel-Compatible DigiCipher (CC DigiCipher) structure? If such an adaptation is not possible, what provision is there for incorporating data from other services? How difficult would it be to change the data type indicators to conform with an industry standard if one were available?

   Please explain the concept of source-adaptive processing. How does it lead to extensibility? What performance or service characteristics can be extended? In what way are they extended?

   What will a CC DigiCipher receiver have to do or have programmed from the beginning in order to handle the extended performance?

2. We interpret this answer to mean that technical information sufficient to begin the writing of both FCC rules and technical standards will be available in the same 4 month period. Will the information supplied in this period be sufficient to permit the start of IC and product design by manufacturers unrelated to your development program?

   What personnel resources will be applied to the development of the necessary documentation? From what organization(s) will those personnel be drawn?

3. We take your answer to mean that no specific plan has yet been developed for the technology transfer. When in the process do you feel it will be appropriate to have such a plan? What will be included in such a plan?

4. How long following the trigger point described in your answer to question G.5 will the IC's be made widely available by IC vendors to consumer and professional product manufacturers?

5. Given a starting point as described in your answer, what is your expectation for the time of introduction of your system following the FCC decision? Please define your interpretation of the concept of system introduction.

Broadcast

1. No further questions.

2. The original questions and your first answers to questions B.2, B.4, B.5, & B.7 are all inter-related. Please reconcile your original answers as well as your answers to these additional questions. Please feel free to combine these additional comments into a short discussion covering all of the listed questions.

   What other signal forms (beyond 787.5/59.94/1:1) do you anticipate for studio production to feed your system? What are the system-wide trade-offs from their use? What provisions must be made in the initial implementation of your system to permit use of the alternate signal formats?

   If the 180 Mb/s compressed form were used in the studio, as you suggest, would it have to be decompressed prior to each of the processing methods – cutting, keying, and full image manipulation – as indicated in your answer to B.4 would be required for the fully compressed signal delivered to affiliates and headends? If full decompression is not required, what level of decompression would be required? Please specify for each type of processing.

   How have you determined that the 180 Mb/s rate is adequate for studio use and would be indistinguishable from the original?

3. Please reconcile your answers to questions B.3, B.4, and B.5. What compression level do you anticipate being used for distribution to affiliates and/or headends? Will it be fully compressed Channel-Compatible DigiCipher or something else with less compression? Please specify the data rate that would be used. Does the compression anticipated use inter-field processing?

4. Is there a possibility of partial decompression of the signal delivered to affiliates and headends for further production? Which forms of processing might be performed with partial decompression? Are there any special system requirements, e.g. special timing relationships between delivered and inserted material, to make the use of partial decompression practical?

   What would happen if the fully compressed signal were cut to another (fully compressed) source?

5. Have you done any simulations of multi-generation compression and decompression? Does this look like a promising possibility or something to be avoided if at all possible?

6. We interpret your answer to indicate the use of digital HDTV signals compressed to 6 MHz and digital NTSC signals compressed to 3 MHz and TDM multiplexed together digitally. Is this correct? Is the modulation on the microwave channel 32-QAM?

7. Contribution circuits are generally regarded as signals that will undergo further processing. What higher rate would you suggest for these kinds of circuits? Please describe the way in which the production quality after multiple encoding/decoding operations is expected to depend strongly on the bit rate.

Cable

1. When conditional access is activated, what is the mechanism by which the picture is scrambled? Can this be done only at the source or can it be done downstream? How complex is it to do? Is it correct to assume that channel synchronization and data stripping can be accomplished at all times, even with a scrambled picture?

Common Carrier

1. Is it correct to assume that by "baseband" you mean the signal that feeds the modulator in your terrestrial transmitter? What is the bit rate of that signal?

2. No further questions.

3. We interpret your answer for "transparent" error rates of 10^{-9} and 10^{-11} to be uncorrectable errors after error correction. What raw error rate is required for your system to achieve each of the corrected error rates?

Consumer

1. Are the VCR features available when directly recording a fully-compressed Channel-Compatible DigiCipher signal? Please comment further on the use of the fully-compressed signal in consumer VCR's. Which features might not be possible or might have limitations? Which ones do you believe will be possible? With what limitations? How are all the features maintained in an environment of inter-field processing?

Satellite

1. We take your response to imply that you only consider a digital TDM multiplex of the signals to be appropriate. Is this correct? What bandwidth do you assume for the transponder?